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Subsets of $\beta\mathbb{N}$ which are not Borel (joint with Neil Hindman)

Anyone who has worked in $\beta\mathbb{N}$ will not be surprised to learn that many subsets of $\beta\mathbb{N}$ which are simple to define algebraically, are not at all simple topologically. Examples of subsets of $\beta\mathbb{N}$ which are not Borel include the set of idempotents, the smallest ideal, every principal right ideal, the idempotents in any minimal left ideal and $\mathbb{N}^* + \mathbb{N}^*$.